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just before feeding. Both birds utilized the top of the blind as a perch at times and both had a stereotyped path of approach to the nest through the branches of the plum tree. Sanitary measures were of the usual kind, the excreta being carried some distance away and dropped while the parents were yet flying.

These birds were an exceedingly interesting family and I have wished to spend more time with them than was possible in the circumstances under which I was working.

NOTES ON THE HABITS OF THE BREEDING
WATER BIRDS OF CHATHAM COUNTY,
GEORGIA

BY W. J. ERICHSEN, SAVANNAH, GA.

[CONTINUED FROM LAST ISSUE]

Hydranassa tricolor ruficollis — LOUISIANA HERON.

Florida caerulea — LITTLE BLUE HERON.

As all of the notes which I have on the nesting of these herons are based on observations made in a fresh water pond on Ossabaw island, it seems not out of place to consider them under one heading, as their nesting habits, as I noted them, are essentially similar. During a visit to Ossabaw island in May, 1915, I estimated the number of pairs of Louisiana and Little Blue Herons nesting there to be between two and three hundred, fully two-thirds of them being the former species. Most of the nests were built in willows, but I noted a few which were placed on the tops of patches of broken down saw grass wherever they were of a sufficiently dense growth to support the weight, and I saw a dozen or more that were built upon the foundations of old nests. Although many nests contained young, the majority of them held from three to four eggs. The nestlings were in various stages of development; some just hatched, while others were nearly old enough to leave the nest. Occasionally one would fall into the water, and if it had attained a sufficient age to have gained enough

strength, would flounder about until it could secure a foothold on one of the many willow stumps which protruded from the water. Whether or not these unlucky youngsters ever succeed in regaining their nests, or a less precarious position, or are identified and fed by their parents until old enough to fly, I am unable to state. It is certain that the very young or weak nestlings which fall overboard are drowned, or are caught by the huge Cotton-mouthed Moccasins which infest the pond. These reptiles also destroy numbers of eggs of the herons.

Throughout the day numbers of these herons can be seen winging their way from the pond to the marshes and creeks at the north end of the island where they feed. They also frequent the swamps in the vicinity of the rookery, feeding upon frogs, crawfish and other animal matter which abounds in such places. The communal instinct, so apparent in their habit of breeding only in colonies, is much in evidence when the birds are feeding, as at this time also they are usually found in companies of from three to a dozen individuals.

These gatherings are nearly always made up entirely of one species; only occasionally will mixed companies be found. Sometimes a solitary individual will be seen patrolling the mud flats and the banks of creeks, but in my experience such occurrences are rare. They are not at all shy, either while feeding or when in the vicinity of their nests. On several occasions while I was wading in the pond individuals of both species alighted on the willows above my head, some even returning to their nests. In connection with their behavior at the nests it may be noted, however, that while the presence of several persons in the pond only slightly disturbed the birds, the acts of breaking a stick within their hearing instantly caused every one to rise into the air simultaneously.

My experience is that the eggs of the Louisiana Heron cannot with certainty be distinguished from those of the Little Blue species, or vice versa, when the two are nesting

in considerable numbers in close proximity. In measuring a large number of eggs those of the former may average a fraction of an inch larger, but both, of course, have the identical tint of bluish green. The same difficulty of identification applies to the eggs of the Snowy Egret, as has been mentioned in the account of that species, and the problem before the collector of the eggs of these three herons is one solved only by "watchful waiting."

If either of these herons winters it must be in exceedingly small numbers, and these must be widely scattered over the immense chain of heavily forested islands and hammocks along the coast, for I have failed to detect either of them in the county during the months of December, January and February. I know of no other locality in Chatham county where they breed, but it is probable that small numbers nest on some of the isolated hammocks which abound on this coast.

Butorides virescens virescens — GREEN HERON.

While this heron is really abundant, the localities at which it breeds are widely separated and most of them are not easy of access. Although colonies are the rule, now and then an isolated nest is found, and, while it prefers localities where there is water, it is often found nesting in dry woods. In a dense thicket of stunted water oaks growing close to the margin of the salt marsh a short distance from the summer home of G. R. Rossignol on Wilmington island, large numbers of Green Herons annually rear their young. On April 18, 1915, nearly every nest here held its full complement of eggs. On May 30, 1915, in a cluster of oaks growing in damp woods near the Herb river and not far from a much travelled highway, I noted a single nest, within arms reach, containing three eggs. These are my earliest and latest dates respectively when fresh eggs were noted. These birds breed in considerable numbers on Sylvan's island on the Herb river some three miles from the town of Tunderbolt, placing their nests in the extreme tops of tall pine saplings. Probably the most populous colony in the county is near Lazaretto station, on

Tybee island. Here the birds breed in a jungle of oaks difficult to penetrate. So numerous are they that every available nesting site is occupied, many new nests being built upon the foundations of old ones. In May, 1915, I found a few pairs breeding in company with several other species of herons in a pond on Ossabaw island. This species prefers oaks in which to place its nest, and as in this pond, willows afford the only tree nesting sites, it breeds there only in very small numbers. Furthermore, it is apparently averse to breeding in any great numbers in company of other species of herons. Its nest is a shabby affair, being simply a few sticks loosely arranged in a circular manner. Nearly every one that I have examined was without the least sign of a depression to prevent the eggs from rolling out, and I cannot conceive by what mysterious force they are held, during high winds, in nests built in exposed situations. On a number of occasions I have been in rookeries during wind storms, but none of the eggs which were left exposed due to my frightening the birds from them, were blown out. The usual complement is four, although sets of five are frequently laid. The color is bluish green, and in size they average 1.40 x 1.10.

Young Green Herons become active at a surprisingly early age and begin climbing out on the limbs near the nest many days before they are able to fly. The parents exhibit much anxiety when the young are disturbed, often threatening to strike the intruder with their sharp bill.

This species is much given to frequenting the salt marshes where an abundance of food is always to be obtained. After it has satisfied its hunger, it resorts to nearby thickets of trees, where it remains concealed and quiet for long periods. Its food is of much the same character as that of other species of herons.

McQueen's island, between the city of Savannah and Tybee island is a favorite feeding ground for large numbers of these herons. This island is eight miles long, but averages only about one mile wide, in some places being but three hundred yards in width. It is almost wholly composed of salt marsh; here and there

a clump of myrtle bushes or a cluster of stunted live oaks breaks the monotony of this long stretch of boggy waste. The Tybee division of the Central of Georgia railroad traverses the entire length of the island, and for several miles on both sides of the track are to be seen the "pool tables." These curious formations are several disconnected series or groups of shallow depressions in the hard marsh. Each group consists of six to ten symmetrical oblong "tables," each measuring about eight by twelve feet and varying in depth from six to eighteen inches. At each high tide these tables are flooded, and hence are always full of water. Each receding tide leaves stranded in these depressions myriads of minnows and much other aquatic animal matter of various kinds. To these "tables" numbers of Green Herons resort at low tide to secure this choice food.

With the advent of the first cool weather, which is usually between the 5th and 15th of October, there begins a pronounced southward migration which continues well into November. I have noticed that on foggy or rainy nights these flights are more noticeable, or perhaps it should be said more audible, since the passing of the birds would be unsuspected were it not for their loud squawks. Their harsh notes can be heard throughout the night, the more inclement the weather the noisier are the birds. A few individuals winter, but during that season they are widely scattered and therefore seldom detected.

Nycticorax nycticorax naevius —

BLACK-CROWNED NIGHT HERON.

This handsome heron must be included among the rare breeding species. It nests in small numbers in the heron colony on Ossabaw island, but nowhere else, as far as local observers have been able to determine. The birds I found breeding there in May, 1915, were very shy, and as it was almost impossible to positively identify their eggs, due to the great similarity between them and those of the Little Blue and Louisiana Herons, little nesting data was secured. I have not seen above ten or a dozen individuals of

this species in Chatham county during the past ten years, and am therefore unable to give any notes on its life history.

Rallus elegans — KING RAIL.

This species breeds locally in the county but I have never found its nest. T. D. Perry has in his collection a set of ten eggs which was collected by a boy on April 20, 1911, in a small reedy pond along the right of way of the Atlantic Coast Line railroad near its junction with the Ogeechee road. I saw no King Rails in the pond on Ossabaw island during my visit there in May, 1915, although a more favorable nesting environment would be difficult to find.

Rallus crepitans waynei — WAYNE'S CLAPPER RAIL.

Throughout the day the harsh cackling notes of this rail can be heard everywhere in the extensive areas of salt marsh along this coast. It breeds in large numbers, and, as the range of this form and true *crepitans* overlaps in winter, it is also found abundantly at that season. It is a marsh prowler to such a degree that, except of course while in flight during migration, it never leaves the boggy fastnesses, and, due to the difficulty of observation, and progress through its haunts, facts concerning its life history are acquired only with the greatest difficulty. There is some individual variation in degree of shyness, and also in nesting habits. Many birds that I have encountered during the breeding season have exhibited a manner close to stupidity, apparently becoming somewhat confused when discovered upon the nest or even when suddenly come upon in the marsh. In both cases, when the marshes are flooded, the bird nearly always takes wing, rising awkwardly and apparently with much effort, uttering two or three syllables of its cackling note; but at low tide it never resorts to this means of escape but always skulks away in the marsh grass. I have only a few times observed it incubating—in each instance, when the tide was out—and then secured only fleeting glimpses; the bird dropping off the nest and quickly gliding from view through the dense marsh.

The almost monotonous sameness of character of this bird's haunts prohibits it any indulgence in variation in selecting its nesting sites. Its bulky platform of water-soaked and decaying marsh grass stems is always placed as high above the mud as the height of the vegetation will permit, but in spite of this, many eggs and young fall victims to spring tides. Besides this menace, this bird has other enemies to contend with. Fish Crows (*Corvus ossifragus*), Raccoons (*Procyon lotor*) and Minks (*Mustela vison lutensis*) take heavy toll, and hundreds are shot every year by gunners for food. Mortality from all causes, however, does not thin the ranks of this marsh-dweller. In fact I believe it is yearly becoming more abundant. Prolificness, and the unchanging aspect of its haunts due to the fact that they are unfit for agricultural or other uses and are therefore not being reduced in area, are the chief factors in its increase, rendering its extinction unlikely.

The breeding season commences early in April and is frequently prolonged through July if repeated mishaps to the eggs have occurred. Although I have examined many nests of this rail I have never found one that contained more than eleven eggs. Seven to ten seems to constitute the usual complement, as far as my observations go, although I have no doubt that larger sets are frequently laid. On April 18, 1915, in an area of short marsh grass on Cabbage island that is frequently flooded, I found seven eggs which had been deposited simply on the soft mud, no evidence of a nest being noted. Although the marsh had not been flooded since the eggs were deposited, the latter were cold and apparently deserted. No doubt the female was compelled to lay before she had time to construct a nest. The eggs of this bird exhibit little variation in ground color or the color and size of the spotting. The former is quite constant, being a deep buff, while the markings are usually small, rounded and quite well defined; brown and lilac, and generally scattered over the entire surface.

This bird is quite an item in the food supply of people living on the "salts," particularly negro fishermen. Numbers of the latter have assured me that the eggs also are

very good eating. The negroes seldom, if ever, walk in the marsh in search of the eggs, but paddle through the creeks and secure what they can find in the marsh close to the banks. Consequently the number taken is inconsiderable as most of the birds build their nests some distance from the rivers and creeks.

Much is yet to be learned of the behavior of this marsh-dweller. Large areas of its marshy retreats are inaccessible unless the observer is provided with some means of progress through them that will eliminate bogging, as the mud in those areas, which are flooded at high tide, is often a foot or more deep and very soft and an invasion afoot is usually impossible.

Gallinula galeata — FLORIDA GALLINULE.

I have secured very little data on the nesting habits of this interesting species, and my knowledge of its distribution and abundance in the county is not extensive. It was not until 1915 that it was added to the list of breeding birds of Chatham county. In May of that year G. R. Rossignol, Frank N. Irving and the writer visited Ossabaw island where a number of pairs were found breeding in a fresh water pond. The data follows: May 11, nest containing seven fresh eggs; May 14, one nest containing eight slightly incubated eggs, and one containing five fresh eggs. On the latter date we also noted a nest containing one egg. All of these nests were built a foot above water, in tall reeds and cat-tail flags, and were composed of dead and water-soaked stalks and leaves of these plants. The first nest was discovered by Mr. Irving soon after we had entered the pond. Four feet from this nest was a dense clump of tall reeds, just within the edge of which I stood motionless for an hour and a half, in water waist deep while a torrential rain completed the drenching and added to my discomfort; all in hopes of catching a glimpse of one of these shy birds. Soon after I took my stand in the reeds I heard a gallinule utter its note and splash about in the water a few feet from the nest, but I was unable to catch sight of it through the dense vegetation. Fully an hour

elapsed during which I heard or saw no gallinules in the immediate vicinity of the nest which I had under observation. I was rapidly growing impatient, not through diminishing interest in the object which had caused me to remain motionless in the reeds for so long, but because of my exceedingly uncomfortable position in the waist-deep water and driving rainstorm.

I was on the point of deserting my post when a loud splashing in the open water near the nest announced the close approach of a gallinule, and a moment later I saw the bird climb up the runway of broken-down reeds to the nest. It remained here only a minute, however, diving into the water and disappearing, having possibly caught sight of me. The gallinules in this pond apparently were restless, continually moving hurriedly from place to place even when undisturbed by us, and were very noisy. Their cackling notes constantly uttered gave the impression that they were abundant, but it is doubtful if more than six or eight pairs were nesting in the pond. We occasionally caught sight of one as it swam across an open space of water. If suddenly encountered they would either dive or spatter swiftly away along the surface of the water, usually choosing the latter method of escape.

The eggs that we collected present little variation, the ground color being buffy, finely spotted with reddish brown. They average 1.70x 1.20.

Many eggs and young of this species are, no doubt, destroyed by Cotton-mouthed Moccasins, which abound in this pond. These ebony denizens of this bird refuge are annually increasing in numbers as they have few natural enemies and are seldom molested by man, as the repellant nature of this rush-grown pond is sufficient to dampen the ardor of anyone but the most enthusiastic bird student. I secured some interesting notes on the habits of these reptiles. On land they are at all times lazy and sluggish, but are extremely active and wary when in the water, swimming with ease and great rapidity. While wading in the pond I frequently noted huge fellows coiled about some limb close

to the surface of the water awaiting an opportunity to make a meal of heron's eggs. At such times a close approach was impossible, as the reptiles would plunge into the water below while I still was some distance away.

Philohela minor — WOODCOCK.

This fine bird is rare at all times in the immediate vicinity of Savannah but probably occurs more numerous in the less settled sections of the county. On February 8, 1917, Mr. W. M. Kidwell of Savannah collected a fine set of four fresh eggs near Pooler. This set is now in the collection of T. D. Perry. These are the only eggs of this species that have been taken in the county. On April 8, 1917, while in company with T. D. Perry, I flushed an adult and four nearly grown young from a cover of tall dried grass interlaced with low bushes in a tract of wet woods just east of Big Four Park. Although I saw the exact spot where two of the birds alighted, I did not again succeed in flushing them. The locality where I noted these birds affords ideal nesting sites for this species, and there is no doubt in my mind that this brood was hatched close to the point where I noted it.

Catoptrophorus semipalmatus semipalmatus — WILLET.

The Willet's haunts are sand banks and mud flats adjacent to sounds and inlets, from which, during low tide, when they are exposed, the birds glean an abundant supply of food. This species breeds abundantly on most of the small coastal islands and hammocks between Tybee and Warsaw islands. Apparently it is absent from Ossabaw island, for I noted none on the north end of that island during a part of May, 1915. Its center of abundance on the coast of Chatham county is the southern end of Cabbage island, where numbers annually resort to breed. It nests sparingly on Buck Hammock, where I noticed a nest on June 14, 1914, containing four eggs on the point of hatching. On July 4, 1915, I flushed an adult from a nest on Cabbage island containing four eggs which also were on the point of hatching. This is my latest breeding record. In 1917 I again visited Cabbage island, and on May 13

noted a dozen or more nests containing four eggs each, all far advanced in incubation. This is the earliest date upon which I have noted full complements of eggs.

The nesting environment of this species is the shell-strewn and grassy areas well above high water mark. It is essential that there be an abundance of vegetation as protection for the eggs and young. The bare wind-swept sandy areas are never used as nesting sites, as their aspect is continually changing, due to the absence of vegetation necessary to bind the sand to prevent its shifting. When placed among wild oats and other dense beach vegetation, Willets' nests are exceedingly hard to find if the birds are not incubating. The exact location of ninety percent of the nests I have found was made known to me by flushing the sitting bird. If the uninitiated bird student desires a glimpse of their treasures he should never visit their breeding grounds before the sun is well up, as an early morning hour will generally prove to be an unfortunate and disappointing choice of time. At this time the birds are feeding, and therefore are absent from their nests. Willets, of course, feed at other times of day, but it is only at a very early hour that a concerted movement of the birds toward their feeding grounds is observed. Oftentimes this species makes no nest other than scooping out a shallow depression in the sand to prevent the eggs from rolling. On many occasions, however, I have found really elaborate nests of soft fibrous grasses gathered from localities some distance away. Quite frequently, too, I find eggs deposited in grassy spots in which situations the birds use the growing grass for nest material, simply bending it down and arranging it in a circular manner. The usual complement of eggs is four, and provided the first laying is hatched and the young successfully reared, the birds will not lay again that season. It is usually necessary, however, for a large percentage of the birds to lay two or three sets of eggs before they are finally successful in raising a brood. In addition to those that are collected by ornithologists and others, numbers of eggs are destroyed by predatory animals, and unusually high tides wash many away. Being

rather handsome, and exhibiting considerable variation, they are much in demand by oölogists. The ground color is usually olivaceous-drab, but often is brownish-olive and sometimes light clay-color. The markings are numerous; generally heavy; sometimes evenly distributed over the entire egg though generally thickest and largest at the greater end. The color of the markings is umber-brown of varying shade. Besides this there are numerous paler shell-spots. Average size of eggs, 2.00 x 1.50.

Willetts appear to be greatly concerned when their breeding grounds are invaded. Whenever I visit Cabbage island the landing is usually made at a point near the north-western side, in order to avoid dangerous breakers. Most of the Willetts inhabiting the island breed close to this point, and a moment after I set foot upon land the air is filled with gyrating, vociferous birds. As long as a person remains in the vicinity of their nests, the birds keep up a continual outcry; circling back and forth overhead, and often hovering on quivering wings. Frequently they alight on some nearby mud flat or sand bank, and gather in groups of three or four.

This species has noticeably decreased in numbers during the past six years. It shows a very strong attachment to a locality as long as favorable conditions exist there. However, incessant persecution will finally drive it to other sections.

Ochthodromus wilsonius — WILSON'S PLOVER.

This dainty bird of the beaches breeds abundantly on the coast islands. It is, however, absent from many localities which apparently are suitable. The breeding season commences in May, my earliest record being May 13, 1915, when I noted full complements of fresh eggs on Ossabaw island. Its nesting environment is substantially the same as that of the Willet, and the two are ordinarily found breeding in close proximity. It is more abundant on Cabbage island than anywhere else in the county, although the beach area suitable for nesting is of rather small extent. It makes no nest other than scooping out a shallow hole in

the bare sand. Three eggs is the full complement. The ground color is pale buff; occasionally deep buff; several specimens I have seen were nearly pure white. The markings are blackish or very dark brown, and are mere dots and specks, but spread thickly and evenly over the egg. Very rarely do they tend to congregate about the larger end, or show a tendency to aggregate into splashes. The average measurements are 1.45 x 1.05.

Although not wary in the sense that they cannot be closely approached when absent from their nests, Wilson's Plovers invariably leave their eggs while the intruder is yet some distance away. As their eggs harmonize perfectly with the sand and shells among which they are deposited, they are very difficult to discover. A method I pursue, which I usually find successful if the air is still and the sand not settled by rain, is to systematically follow the birds' tracks which invariably leads me to their nests; for, according to my observations, the birds usually, when leaving their eggs, run some distance before taking wing. They exhibit much solicitude when their breeding grounds are invaded, following the intruder for long distances and uttering a sharp whistling note consisting of a single syllable.

The young are adepts at hiding among the grass and shells, and it is difficult for the observer to locate them even though knowing exactly where to look for them. They are able to run about immediately after leaving the shell, as the following occurrence will show: On May 31, 1917, a novel and interesting incident occurred in connection with my study of the nesting habits of this species. In company with G. R. Rossignol and T. D. Perry, I visited Cabbage island, where Wilson's Plovers nest in some numbers. Mr. Perry, desirous of securing eggs of this species and the Willet, had collected a few full sets of each, and a single egg of the Wilson's Plover which he supposed was addled. Returning in the late forenoon to the summer home of Mr. Rossignol on Wilmington island where we were staying, we deposited the collecting basket containing the eggs in a room, and retired to the front porch of the house. An interval of about two hours had elapsed when

I heard a faint peeping sound emanating from the room in which we had left the collecting basket. Upon investigation, I discovered that the Wilson's Plover egg had hatched, and the downy youngster was actively running about the room, seemingly much at home in its strange environment. The specimen, preserved in alcohol, is now in Mr. Rossignol's collection.

Haematopus palliatus — OYSTER-CATCHER.

Although this fine bird nested abundantly on this coast twenty or twenty-five years ago, as I am informed by T. D. Perry, it is now so rare that I have seen but two nests during the past ten years. On May 10, 1915, Frank N. Irving, in whose company I was, found a single egg deposited in a depression on top of a wall of oyster shells on Raccoon Key. On the 15th we returned to the Key, but discovered that during our absence an unusually high tide had washed the egg off the wall. During an expedition to Cabbage island on May 12, 1918, in quest of eggs of McGillivray's Seaside Sparrow (*Passerherbulus maritimus mcgillivrayi*), T. D. Perry and I located a set of three slightly incubated eggs of the Oyster-catcher. These eggs also were deposited in a slight depression on top of a bank of oyster shells which had been thrown up by the surf. Where nesting sites of this character can be found, this species always selects them. The eggs are creamy white or pale buff, thickly spotted with very dark brown. They measure 2.25 x 1.50. This species is very uncommon and widely scattered in this county during the breeding season, as well as during the winter months, and I have had almost no opportunities to observe its habits. The few individuals that I have encountered were excessively shy, leaving the vicinity at my approach.